Large-Scale Stabilization Study

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Value of Studying Stabilization Processes

- **Understand Effectiveness of Calcination: Impacts on Wt.% Moisture, Corrosives in Product, Corrosion and Availability of Calcining Equipment.**
- **Understand Rate of Moisture Readsorption: Impacts on Wt.% Moisture in 3013 Container, Corrosion of 3013 Container, Acceptability of 3013 Containers with Questionable Moisture Values, Effectiveness of Diffusion Barriers (Lids, Etc.) on Interim Containers.**
- **Identify Containers that May Need Greater Levels of Surveillance: Identify Systems that Rapidly Adsorb Moisture and/or Contain Corrosives that Survived Calcination.**

Planned Studies

- **Calcination: Determine Sweep Gas Flowrate Across Boat, Temperature Distribution in Boat for Various Configurations of Material and Depth, Corrosion of Boat and Furnace.**
- **Cooling/H□andling: Determine Moisture Uptake as Function of Conditions (T, Sweep Air Rate, RH, Bed Depth). Principal Dependent Variable: Weight Change.**
- **Supporting Work: TGA on Initial Materials and TGA/SFE on Products. Chemical Analysis of Corrosion Products or Unknowns. Small Scale Surrogate Tests.**
- **Use CeO_2 and $CaCl_2$ for testing; confirm with PuO_2 mixtures later.**

Experimental Design for Single Experiment for Material Category 1 (Cerium Oxide)

- **Relative Humidity: 60%**
- **Sweep Flow Rate: 30 $Cm^3/Min/Cm^2$**
- **Bed Depth: 2 inches**
- **Bed Density (chunkiness): Fine powder**
- **Initially only one experiment will be conducted for Cerium Oxide.**

Fractional Factorial Design for Material Categories 2 (2 Wt%CaCl2) and 3 (10 Wt%CaCl2)

Material Category	Relative Humidity (%)	Sweep Flow Rate ($Cm^3/Min/Cm^2$)	Bed Depth (inches)	Bed Density (chunkiness)
2	3	15	1	50%
2	9	15	1	Fine
2	3	30	1	Fine
2	9	30	1	50%
2	3	15	2	Fine
2	9	15	2	50%
2	3	30	2	50%
2	9	30	2	Fine
3	1	15	1	Fine
3	3	15	1	50%
3	1	30	1	50%
3	3	30	1	Fine
3	1	15	2	50%
3	3	15	2	Fine
3	1	30	2	Fine
3	3	30	2	50%

Experimental System Design for Large Scale Surrogate Moisture Uptake Tests